DEPARTMENT OF THE ARMY
U.S. Army Corps of Engineers
Washington, D.C. 20314-1000

CEMP-ET

ETL 1110-1-180

Technical Letter
No. 1110-1-180

29 August 1997

Engineering and Design
HUMIDITY AND CORROSION CONTROL FOR NATATORIUMS

Distribution Restriction Statement

Approved for public release; distribution is unlimited.

Report Documentation Page

Report Date	Report Type	Dates Covered (from... to)
29 Aug 1997	N/A	-

Title and Subtitle Engineering and Design: Humidity and Corrosion Control for Natatoriums	**Contract Number**
	Grant Number
	Program Element Number
Author(s)	**Project Number**
	Task Number
	Work Unit Number
Performing Organization Name(s) and Address(es) Department of the Army U.S. Army Corps of Engineers Washington, DC 20314-1000	**Performing Organization Report Number**
Sponsoring/Monitoring Agency Name(s) and Address(es)	**Sponsor/Monitor's Acronym(s)**
	Sponsor/Monitor's Report Number(s)
Distribution/Availability Statement Approved for public release, distribution unlimited	
Supplementary Notes	
Abstract	
Subject Terms	
Report Classification unclassified	**Classification of this page** unclassified
Classification of Abstract unclassified	**Limitation of Abstract** UU
Number of Pages 4	

DEPARTMENT OF THE ARMY
U.S. Army Corps of Engineers
Washington, D.C. 20314-1000

CEMP-ET

ETL 1110-1-180

Technical Letter
No. 1110-1-180

29 August 1997

Engineering and Design
HUMIDITY AND CORROSION CONTROL FOR NATATORIUMS

1. Purpose. This letter provides additional design guidance for the proper heating, ventilating and air conditioning design of natatoriums.

2. Applicability. This letter applies to all HQUSACE elements and USACE commands having Army or Air Force military construction and design responsibility.

3. References.

a. TM 5-810-1, Mechanical Design Heating, Ventilating and Air Conditioning.

b. Architectural and Engineering Instructions, Appendix D.

c. American Society of Heating, Refrigeration and Air Conditioning Engineers, ASHRAE, 1991 Applications Handbook, "NATATORIUMS," 1791 Tullie Circle, NE, Atlanta, GA 30329.

d. AIR CONDITIONING, HEATING & REFRIGERATION NEWS, June 23, 1997, "Dehumidification of Indoor Pool," Business News Publishing Company, P.O. Box 2600, Troy, MI 48007.

4. Distribution. Approved for Public Release, distribution is unlimited.

5. Discussion. Humidity and corrosion continue to be a problem with newly constructed and renovated natatoriums. Additional guidance would be beneficial in preventing these damaging environmental conditions.

6. Action. Compliance with the Architectural and Engineering Instructions, TM 5-810-1, the latest American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) guidelines, and the following advice will provide effective humidity and corrosion control for interior pool spaces.

a. Roof structural elements. Structural members that are continuous from the exterior to the interior of the building should be avoided. Such roof penetrations are difficult to seal air tight and insulating the structural element itself is difficult and often ineffective. As a result, the part

of the structural element within the natatorium has a surface temperature below the dewpoint of the warm moist pool air. Condensation and associated corrosion and insulation damage then occurs. An intermediate space between the roof supports and the pool area that is thoroughly insulated per guide specification is one method to avoid these structurally related condensation problems. A concrete roof structure with their long spanning capabilities is another acceptable method.

b. Desiccant equipment. ASHRAE recommends humidity control by means of additional outside ventilation air in drier climates. In other climates, mechanical dehumidification will be required. Desiccant dryers with waste heat recovery can be a cost effective alternative and should be considered along with other methods of mechanical dehumidification. The equipment materials and components shall be specifically designed and specified for high humidity swimming pool environments to minimize, if not eliminate corrosion.

c. Controls . Most pools have a number of independent mechanical systems such as air handling units, dehumidification equipment, heat recovery systems, and pool water heaters with the associated dampers and pumps. It is important for the designer to coordinate the controls of these mechanical systems to ensure the effective operation of not only each component, but the combined system.

d. Pool covers. A method to aid humidity control and conserve pool heat is by the use of swimming pool covers. The designer should be aware that during unoccupied periods when the pool is covered, dehumidification equipment operates very infrequently. Heat recovery from the dehumidifiers is extremely limited during these time periods. Alternate heat sources should be provided as needed.

e. Quality control. A successful natatorium design will never be realized without the follow through of an effective construction quality assurance program. This includes the proper installation of all pool interior hardware, mechanical systems including controls, insulations, vapor barriers, and caulking. An effective quality assurance program during both the design and construction phases will help ensure a facility that meets the users needs without either humidity or corrosion problems.

7. Implementation. This letter will have routine application as defined in paragraph 6c, ER 1110-345-100.

FOR THE COMMANDER:

KISUK CHEUNG, P.E.
Chief, Engineering Division
Directorate of Military Programs